

Chew (S.C.)

# THORACENTESIS;

WITH

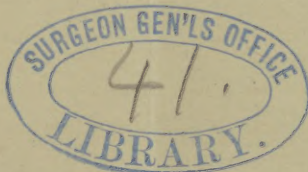
ILLUSTRATIVE CASES.

BY

S. C. CHEW, M. D.,

PROFESSOR OF THERAPEUTICS AND CLINICAL MEDICINE IN THE UNIVERSITY  
OF MARYLAND, BALTIMORE, MD.

[REPRINTED FROM THE NEW YORK MEDICAL JOURNAL, SEPT., 1876.]



NEW YORK:  
D. APPLETON & COMPANY,  
549 & 551 BROADWAY.

1876.

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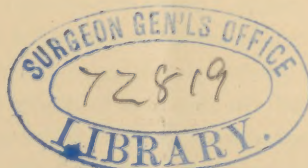
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## THORACENTESIS; WITH ILLUSTRATIVE CASES.

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OUR knowledge of the pathology and diagnosis of pleurisy is so extensive and accurate that the discussion of these subjects is hardly called for. I shall, therefore, refer to them only incidentally in this paper, and consider chiefly some questions connected with the treatment of the disease.

The therapeutic measures proper to the various stages and conditions of pleurisy have been the subject of much controversy, and involve some questions of great interest, about which there is even now very earnest dispute.

The questions I refer to are these: When a pleurisy is encountered in which effusion has taken place to such extent as to cause dullness and absence of respiratory murmur over the greater part or the whole of one side of the chest, is medical treatment to be discarded and the assistance of surgery invoked? Should the presence of fluid in large amount be considered as *ipso facto* and independently of accompanying circumstances an indication for surgical interference; or is it possible to obtain in this stage, from medical means in the strict sense, better results than those promised by surgery?

Are we to regard the operation of paracentesis of the thorax as in all cases justifiable and advisable when the effusion has reached any considerable amount; or is it to be resorted to only in certain special conditions, the larger proportion of cases being best dealt with by medical means?

Of late years, and more especially since the publication of Dieulafoy's work, the operation has been strongly advocated as a measure generally applicable to all cases of pleurisy; but I am fully persuaded that the advocacy of this measure has been carried too far, and that there is need for a recall from the shorter and apparently more attractive course of surgical procedure to the older and more reliable methods of medicine. It is not meant here to undervalue the operation of paracentesis in cases to which it is really adapted, for it undoubtedly affords at times the only hope of restoring the function of a lung and thus of ultimately saving life; and, in other cases where respiration is seriously embarrassed by a sudden effusion, it may give deliverance to one who is ready to perish.

But with due regard to such cases, and speaking from considerable personal experience in the operation, and from observation of its effects as used by others, I think that there are limits beyond which its use cannot be carried except at the risk of doing more harm than good. It is as important a point of therapeutic knowledge to be aware that many cases will recover without tapping as that some imperatively require the operation. The application of the principle of pneumatic aspiration for the removal of fluid from the closed cavities and other deep portions of the body has rendered the surgical treatment of pleurisy much simpler than it formerly was, and has done away with that special danger of the operation which was found in the possibility of air entering into the pleural sack. But it is certainly questionable whether the very readiness with which the operation is performed may not lead to an undue, not to say reckless and dangerous, use of it. The ease with which a thing is done may cause a proneness to do it; and it may happen in medicine as in morals that

" Oft the sight of means to do ill deeds,  
Makes deeds ill done."



As for the operation of thoracentesis in itself, it is by no means a grave one; and while it may accomplish remarkable physical results in the removal of a large quantity of fluid, yet, the more obvious and striking these are, the simpler is the operation, for the larger the amount of fluid contained in the chest, the easier is the diagnosis of the condition, and the greater the assurance that the needle or trocar will enter the fluid only and will not pierce the lung.

The real importance of this operation is found in the facts that life may be saved by it in conditions of extreme peril, and that it presents an available measure when medicine fails to give relief. These propositions I shall illustrate presently by cases directly in point. As there are conditions, then, in which aspiration is not only indicated, but is altogether the only resource at our command, it is highly important to determine what those conditions are.

Because it is an advisable and salutary measure in some cases, it seems to have been too hastily inferred that it is advisable and salutary in all; and there is thus furnished another one of the many instances of a tendency to hasty generalization, of which the annals of medicine are only too full.

Look at some of them in the past and in the present. Febrile symptoms were found associated with gastric and enteric inflammation; and from these cases Broussais too quickly inferred that gastro-enteritis is the essential and underlying cause of all fevers.

A congested spleen is often found in malarious disease; and Piorry, forming a hasty generalization, and adding to this the additional fallacy of confounding effect and cause, proclaimed enlargement of the spleen to be the pathological condition upon which all the symptoms of intermittent fever depend.

Alcohol is certainly of immense value in certain forms and stages of pneumonia and other inflammatory diseases; and, through this same tendency to generalize, the stimulant school of practitioners have contended that all inflammations are to be treated with alcohol as the most potent of pyretics, and of universal application in all phlegmatiae.

Hasty generalization and illogical inference are no doubt the greatest obstacles to real progress in any science. It is alleged, and not without some reason, that the advance in medicine is not commensurate with that which other sciences have made in recent years; yet it would be easy to find, on the part of some of the most distinguished votaries of other branches of physical science, instances of as shallow philosophizing as any that have retarded the development of medicine.

A leader in modern biology maintains that the whole idea of the relation of cause and effect is an assumption and a delusion; thus denying a primary concept of the mind, because it is inimical to his own theory. And another eminent writer, who occupies a foremost place among physicists, warns his hearers against accepting, on the authority of Newton, a proposition relating to spiritual truths, on the ground that Newton, having been mainly occupied in a different sphere of thought, was disqualified for forming a judgment upon such matters. With what incisive force the *argumentum ad hominum* might be directed against himself, this eminent writer apparently does not see.

While we admit that there are shallows and quicksands in medical philosophy, we may be pardoned for deriving consolation from the reflection that flippant and foolish reasoning may be quite justly imputed to some who are esteemed lights of science beyond the pale of medicine.

To return, however, from this digression to our theme.

There are three classes of cases in which the question of pneumatic aspiration of the thorax must be entertained.

I. The first consists of those cases in which a large pleuritic effusion has suddenly occurred, and has overwhelmed the function of one lung before there has been time for the supplementary action of the other to be brought fully into play; or again, where hydrothorax, as distinguished from pleuritic effusion, has occupied both sides of the chest in such amount that respiration is dangerously embarrassed. In this class of cases the aspirator must be immediately used, because there is no time for medical means to act, and we are to be guided not by the auscultatory signs alone, but by the clinical conditions of the case.



II. The second class is composed of cases in which, judging from the physical signs alone, we might be tempted to use the aspirator, and are certainly bound to examine carefully whether the conditions requiring its use actually exist, but in which the clinical state is found on such examination not to demand immediate interference with surgery. For respiration may not be seriously embarrassed, even though the effusion be very large; the rapidity with which it has occurred being a more important factor in the production of dyspnœa than the amount. In these cases, if the condition has not continued long, it is best to use medical means, of which the most efficient are the tincture of the chloride and the syrup of the iodide of iron in doses of from half a drachm to a drachm; and, notwithstanding that their efficacy is denied by some distinguished authorities, I make bold to urge the repeated application of fly-blisters. These agents are, I am sure, of great value; whether they act by a direct stimulant influence upon the absorbents, or by merely removing serum from the capillaries of the chest-wall, and thus rendering them better instruments for absorption, or yet, again, by an action on the vaso-motor nerves, are questions of interest, it is true, but of secondary importance to the general one as to whether they do good clinically; and, that they do, I am fully convinced. For, though I have used them always of late years in conjunction with iron, yet I have seen the line of dullness fall so rapidly under this treatment as to feel sure the change was due more to the blistering than to the small amount of iron as yet taken. Yet the ferruginous medicines perform an important part by increasing the solid elements of the blood, and thus lessening the tendency to transudation, while, in virtue of their diuretic action, they help to remove what has already accumulated.

But it is contended by some that, even in these cases where there is no urgent need for interference, results better, because quicker, can be gotten by an immediate resort to aspiration, instead of waiting for the slower influence of medicine. It should, however, be borne in mind, that in adopting the medicinal treatment we are effecting relief in the same way as when the case recovers spontaneously.

If the vessels of the pleural surfaces, on the removal of the fluid, remain still in the same condition in which they were when it was effused, it will continue to be formed, and the operation must needs be repeated as long as the effusion goes on; whereas, when the removal takes place by absorption, the pathological action is changed, and the tendency to effusion has ceased.

Again, if adhesion of the compressed lung has taken place, the sudden entrance of an increased amount of blood into the vessels of the lung, and of air into its vesicles, may produce a strain upon the lung tissue left unsupported by the withdrawal of the fluid that has been pressing on its surface; and thus may be explained the sense of painful constriction, with tendency to syncope, from which patients sometimes suffer under these circumstances. This occurrence, so often observed in cases which ultimately do well, may indicate in less degree a condition of things which in greater degree may prove dangerous.

Deaths occurring suddenly or rapidly, during or shortly after the operation of thoracentesis, have been reported in French medical journals within the last year, and have given rise to important discussions in the Medical Society of Paris and in the Pathological Society of London. Opinions have varied as to the way in which the operation may have occasioned death, some attributing it to cardiac syncope, from the withdrawal of accustomed pressure on the heart—others to cerebral anæmia, from the rapid afflux of blood to the expanded lung.

The statement has been made, and a most significant one it is, if proved by accurate statistics to be true, that there has been an increase in the mortality from pleurisy since thoracentesis has been more generally practised. Granting this to be true in even greater degree than is at all likely, it would not follow that the operation should be abandoned, for the greatest triumphs of surgery are won by operations admitted to be perilous, but affording a prospect of rescue from greater peril. But the consideration of even slight danger should teach us that thoracentesis is not to be used indiscriminately as a thing of mere routine; and it should certainly make us



give due weight to what can be accomplished by medicinal means, in imitating and aiding the curative action of nature. For nature cures pleurisies, in the many cases in which they get well spontaneously or under the influence of medicine, by the fluid being absorbed and not directly evacuated.

III. The third class of cases consists of those in which, as in the first class, thoracentesis is plainly required as the only means likely to afford relief. Into this category some cases belonging to the second class just spoken of may pass; cases, that is, in which although at first there may have been a well-founded belief or hope that they would recover under medical treatment, yet either this hope has been proved by time to be fallacious, or the cases when first seen by the physician have manifestly passed beyond the period within which it would be worth while to wait longer for the action of medicine. For here there may be risk of ultimate danger accruing to the lung through long-continued pressure causing carnification. In this third division I would place also those cases in which there is good reason to believe that the effusion is purulent; hence the importance of being able to decide this question with certainty; for, the purulent nature of the fluid once determined, it is useless to continue medication with a view to its removal. Nothing remains but mechanical evacuation. In any case where the fluid is suspected to be pus, an exploratory puncture may be made with a fine aspirating needle, which may thus be a diagnostic as well as a therapeutic means.

But it is sometimes desirable to determine this question beforehand, inasmuch as a patient may be more willing to submit to the operation, if he knows that the fluid is of such character that absorption cannot be expected.

With this view, the method recently suggested by Prof. Baccelli, of Rome, certainly promises assistance to our diagnostic means. "It is founded on the physical law"—I quote from the article on the subject in the *Medical Times and Gazette* of March 18, 1876—"that the vibrations of sound in liquids are transmitted *inversely* to their density. In a serous fluid, therefore, the sound passes more readily than in a purulent; and it is found that whereas the whispered voice can



be heard clearly, accompanied with bronchial expiration at the base of a *serous* effusion, the spoken voice is not transmitted, nor bronchial breathing heard over a *purulent* exudation." Perhaps this is a somewhat exaggerated statement of the case, but there is certainly a marked difference in the vibrations transmitted through the two fluids respectively. We have, therefore, in feebleness or absence of vocal or respiratory sounds, a highly probable indication that the fluid is pus, and an earlier sign of empyema than the occurrence of hectic fever, the continued presence of the unabsorbed effusion, and other general symptoms.

The several conditions, then, which I would group together in the third class as clearly requiring the use of the aspirator, are these :

1. Where the purulent character of the effusion is indicated with certainty or with high probability.

2. Where an effusion reaching half-way up one side of the thorax is undiminished by medical treatment persistently applied for three or four weeks ; and, *a fortiori*, if it have increased in spite of such treatment.

3. Where with a large effusion, previously not alarming in character, sudden and urgent dyspnoea has occurred. Lives have, no doubt, often been lost from the operation having been delayed or not performed in such conditions ; but, with its use, under the most threatening circumstances, prompt relief and deliverance have many times been given.

The following cases are selected as illustrations of the principles of treatment that have been referred to, and of the conditions which are to be regarded as respectively indicating or not indicating the use of the aspirator. As to the first class, I would remark that they very seldom require tapping ; and I have never had occasion to use this measure in treating such cases. The urgent dyspnoea which sometimes comes on early in pleurisy, even when the amount of effusion is not large, generally abates pretty soon by the supplementary action of the other lung being established ; and it may often be promptly relieved by an hypodermic injection of morphia ; and cases of hydrothorax are in general better treated by diuretics or hydragogue cathartics, especially elaterium, which drains

away the fluid with astonishing rapidity, and thus produces marked relief. But, when the pleuritic effusion is at once very large in amount and rapidly poured forth, it may become necessary to tap from the urgency of the symptoms; and in hydrothorax there may be occasionally need for the same interference when the effusion rises rapidly on both sides. Such cases are, however, exceptional.

CASE I.—W. S., about twenty-five years of age, entered the hospital of the University of Maryland, in my service, on the 26th of February, 1876, complaining of slight shortness of breath, which had not been preceded by pain nor caused him to suspect any serious trouble in the chest. He had been much exposed to wet and cold in prosecuting his business, which was that of an artesian-well borer.

On examining his chest I found the left side flat upon percussion from diaphragm to clavicle; vocal fremitus absent; respiratory murmur inaudible; and on the right side puerile respiration was well marked. On measurement the left side was found to exceed the right in bulk by one inch and a quarter. The physical signs thus showed plainly the existence of large pleural effusion; but as there was little discomfort, and the dyspnoea was so slight that the patient could sleep all night in the recumbent posture, the clinical condition did not require the use of the aspirator, and I determined to try medical treatment alone, directing thirty minims of the syrup ferri iodidi to be taken three times a day, and a fly-blister, six by eight inches, to be applied to the lateral and posterior surface of the left side. The blister drew freely; and, before the surface to which it was first applied had healed, it was again placed upon the anterior part of the same side. In five or six days from the commencement of treatment the dullness under the left clavicle had sensibly diminished, and a respiratory murmur of a broncho-vesicular character was feebly audible. This was regarded as an indication for persevering in the medical treatment, and fortified the opinion that aspiration was not required. The iron was continued, and the blister re-applied at different places several times.

In three weeks the line of dullness had fallen to the top of the middle third of the chest, respiratory murmur being dis-

tinged above that line; and the difference in bulk between the two sides was reduced to three-quarters of an inch. The dullness continued to diminish slowly, and vesicular murmur became more generally diffused over the chest, when on the 15th of April the patient left the hospital, still presenting at that time some dullness and feebleness of respiratory murmur at the base of the left side. On the 1st of June he returned for examination, when all signs of the effusion had disappeared. The case is interesting as presenting a condition in which the auscultatory signs alone would suggest the use of the aspirator, while the general clinical condition warranted the trial of medical means, under which perfect recovery took place.

CASE II.—D. W., about twenty-eight years of age, came to my office to consult me on the 15th of October, 1875. He had recently returned from travel in Europe, and, though of rather delicate constitution, had enjoyed pretty good health until about ten days before he applied to me, when being overheated by a long walk he lay for some time upon the damp grass, and in a few days began to experience shortness of breath, chiefly noticeable on going up-stairs. He had had no chill, and, having felt no pain in the chest, he was surprised when I informed him that his right side was the seat of large effusion. This was rendered evident by dullness throughout its whole extent, absence of respiratory murmur and vocal fremitus, and the existence of well-marked ægophony at the upper part. Under the use of syrup ferri iodidi and the repeated application of blisters, improvement in resonance in the subclavicular region, with distant and feeble respiratory sound, became evident in about ten days. At the end of three weeks the dullness was limited to the lower part of the posterior region of the right side, and was attributable mainly to thick, fibrinous deposit, inasmuch as vesicular murmur was comparatively clear. The patient made a good recovery, and has lately gone again to Europe.

This case, like the last, was one of latent pleurisy, in which the auscultatory signs showed effusion so large as to suggest the possible necessity of aspiration, but which nevertheless cleared up perfectly under medical treatment.

CASE III.—H. Y., aged about forty-five years, a native of



Alsace, presented himself at my clinic at the University Hospital, May 23, 1876, suffering with urgent dyspnoea, about the origin of which he gave no clear account, but which, according to his report, had increased to such degree that for four months he had been unable to lie down. On inspection, the right side was manifestly larger and more rotund than the left, its measure being an inch and a half greater, and the intercostal spaces were effaced. Percussion sound was perfectly flat on this side from the base to the summit of the chest; respiratory murmur and vocal fremitus were imperceptible, and the heart was displaced beyond the left mammary line. The physical signs thus established the diagnosis with precision; but the clinical condition put the case in a different category from those related above, and demanded mechanical relief; for, with such impairment of respiration, rapidly fatal dyspnoea might occur at any moment, and the danger was increased by the dislocation of the heart, and the great pressure to which it was subjected. I therefore decided to aspirate the chest; and, introducing a No. 2 needle in the eighth intercostal space, just below the angle of the scapula, I drew off eighty-one ounces of yellow serum, in which pus corpuscles were beginning to appear, but were not present in sufficient number to give the fluid a purulent character. The patient bore this without the least sense of constriction, such as is often felt when so large an amount is removed at once. The lung expanded somewhat, but not perfectly, after the removal of the fluid, the respiratory sound being plainly audible, but distant and bronchial in character; the heart removed partially but not completely into its normal place. But the clinical condition was immensely improved; the dyspnoea, which had been extreme, disappeared entirely, and on that night the patient slept lying on his back, for the first time, as he assured me, for four months. In six days he left the hospital, declaring that he felt well, and has not returned.

In this case the operation was resorted to, not so much as a curative means, as for the purpose of rescuing the patient from great peril—which was accomplished. Life was, I believe, saved by the operation, and could have been saved by no other means; but the functional integrity of the lung was

not restored, as it was in the two former cases, in which medical means alone were used.

CASE IV.—On the 9th of August, 1875, I was requested by Dr. J. E. Gibbons, of this city, to see with him a little boy, aged three years and eleven months, who was the subject of empyema of the right side, for which he had already been tapped with the aspirator three times, twice by Prof. W. T. Howard, and once by Prof. F. Donaldson. Learning that each operation had been followed by reaccumulation of the purulent fluid, I determined, before resorting to a drainage-tube, to try the effect of an injection into the chest-cavity, with the view of altering the condition of the pleural surfaces, and, if possible, bringing about adhesive inflammation. The entire right side was flat upon percussion, the intercostal spaces distended, and the breathing labored and accompanied with incessant cough. I introduced the needle of the aspirator near the angle of the scapula, and removed forty ounces of pus, a quantity which would very completely fill one side of the chest in a child of this age. There was evidently no adhesion, for the lung expanded freely, loud respiratory murmur and perfect resonance being at once established.

Without removing the needle the action of the pump was now reversed, and three ounces of tepid water injected, containing one drachm of the following solution :

Liq. iodinii comp.,	℥ ij.
Acid. carbolie.,	℥ ss. M.

The dyspnœa was at once relieved by the tapping, as it had been by the previous operations; but for several days there was high fever, probably attributable to the injection. By September 10th, reaccumulation had, however, taken place to such degree that another operation was necessary, which was performed by Prof. Donaldson. It was noticeable that the fluid had undergone a change in character, being of thinner consistency than before; and from this time the child recovered perfectly, and is now entirely well, as is shown both by the general condition and appearance, and by the normal respiratory murmur and resonance over the whole of the previously affected side.

This case is of peculiar interest, from the age of the patient, the very large purulent drain from the system—two hundred and eight ounces in all—and the entire restoration of the function of the lung.

Dr. Peacock, of Victoria Park Hospital, London, has lately published a case of empyema in a child three years and a half old, relieved by paracentesis, but resulting in contraction of the side and a fistulous opening. In the case I have here reported, the contour of the chest and the action of the lung are as perfect as though no disease had ever existed; and I am inclined to attribute the result mainly to the iodine and carbolic acid injection; for although the thorax filled up once more after this application, yet the appearance of the fluid at the last tapping showed that an alterative influence had been exercised upon the secreting surfaces, so that, when they were again brought into contact with each other, adhesion probably took place. Boinet was, I believe, the first to employ iodine injections in chronic pleurisy, and he claimed that with them "cures were possible even in cases supposed to be necessarily mortal." His practice was followed by M. Aran in France, and by Dr. Brainard in this country. This latter gentleman reported, many years ago, a case of empyema caused by a wound with a knife, in which a solution of one grain of iodine and three grains of iodide of potassium in an ounce of water was injected into the pleural sac twice a day, with perfect success.

Many other cases have been reported, with results similar to what occurred in the child whose history is here recorded. I think it best to make use of the iodine injection several times, without resorting too early to the drainage-tube, which at best leaves a fistulous opening of long continuance. The aspiration facilitates the injection very much, as all that is required is to reverse the pump without withdrawing the needle. I have never known a more gratifying therapeutic success than the case of this little child has afforded; for what with extreme dyspnoea, incessant cough, hectic fever, and abdominal dropsy, with anasarca from pressure on the great veins, it presented almost as hopeless a prospect of relief as I have ever had to contemplate; and it is now perfectly well.





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